

Notes on Howies Ground Current Integrator

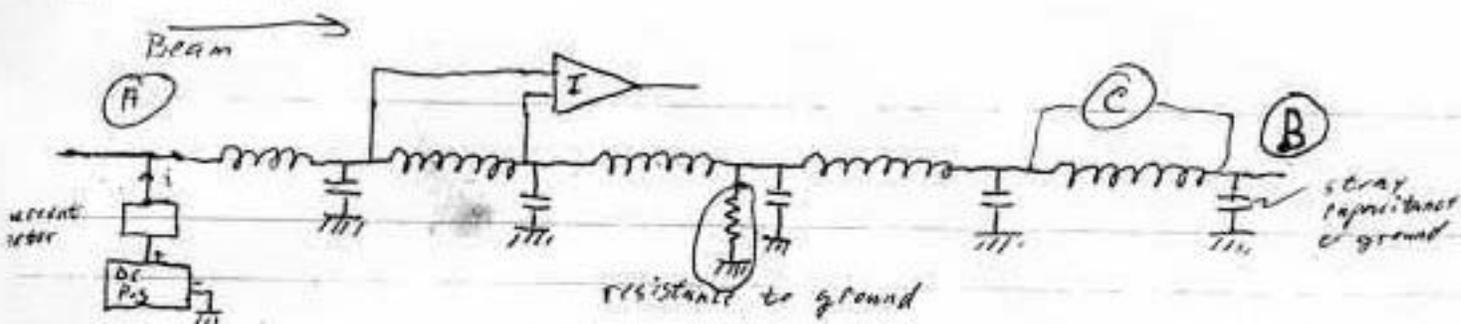
I. What is needed

- Integrator module + 3 SHV cables
- Current meter
- Bench Top supply (such as a lambda) to provide the necessary voltage & current
- Bud Box connectors to connect to Voltage Taps

II Things to do

- Take supplies out of the circuit
- Disconnect distributed grounds
- Beware of crossovers at "O" locations
- It isn't necessary to remove QBS cables

III Principle



When you turn on the lambda supply, the output voltage is: $V = L \frac{di}{dt}$. Integrating gives $V \cdot dt = L \Delta i$ (note, this implies magnets must be superconducting, else you must add a $\sim IR_{DC} \Delta t$ term!).



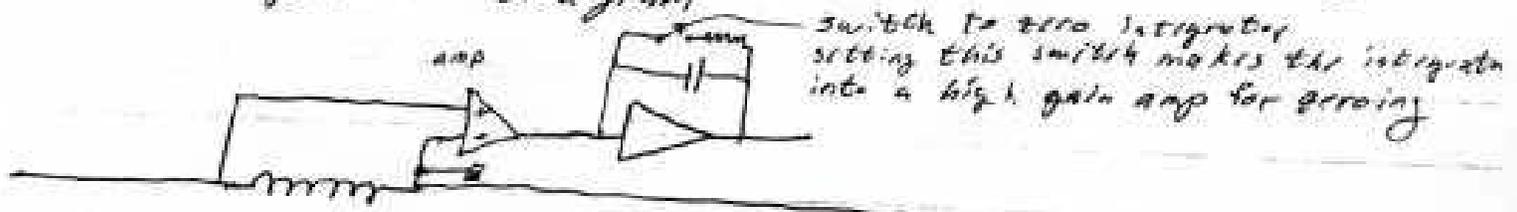
After ~ 1 sec you should get a constant rate of rise

IV Operation

- A. Insure you connect the integrator + & - cables to the proper bus & make sure ~~you~~ you are across some coils
1. connect the green ground cable to the - cable
- B. Set up P.S. & current meter at a convenient location. Always turn up the voltage until you get 2-3 milliamps of current
- C. Zero the integrator
1. Set the toggle switch towards the pot and adjust the pot until the meter on the integrator reads zero, flip the toggle switch to the right to check for drift, flip it back & re-zero, etc until there is little or no drift.
- D. Turn on P.S. (P.S. polarity doesn't matter) & adjust to 2-3 mA & see how far the integrator integrates to & record this value. For the configuration in the "Principle" diagram, we would see ~ 300 counts above the drift (sign of the output doesn't matter. With the P.S. @ "A" & the integrator @ "B", we would see only a few counts
- With the P.S. @ "B" & integrator @ "C" we would see ~ 300 counts again.
- E. Confirm you have found the grd. fault by moving the P.S. to both sides of the ground fault & in one case you will get a large signal & in the other, a small signal.

V. Additional Equipment

- A. Extension Cords
- B. Torches & heat guns
- C. Hipotter (in case current to grad. starts to disappear, the hipotter can bring it back)
- D. Integrator diagram



VI Hipot Notes

A. If there is a sparker, make certain that there are no possible paths from some point to where you are measuring; take out all TV P.S.'s & disconnect the distributed grounds (so you can get to a high enough voltage). This means disconnect all QBS cables that attach to that QBS. This means you disconnect ANYTHING which can "transmit" the voltage pulse to you!

Remember: ① Voltage Tap connectors, ② 50 Ω Terminators, ③ Scope, camera & film ④ ~~two~~ 2 sets of long cables and pamma box capacitive couplers & BNC to alligator clip leads

Good procedure may be to start at the 1st P.S. that is out of the circuit & disconnect all the QBS cables for that QBS; if the short is @ the last spool, disconnect the next set of QBS cables & continue.